Spatial Perception via Tactile Sensation

Ned Block
Departments of Philosophy and Psychology
New York University
New York, N.Y
USA
E-mail: ned.block@nyu.edu

If a sensory brain state plays an unusual functional role, does the phenomenology go with the role or the brain state? If the phenomenology goes with the functional role, that supports functionalism, which is the view that phenomenology just *is* the role. If it goes with the brain state, that supports physicalism, which is the view that phenomenology is what *realizes* or implements the role. I agree with Gray [1] as against Noë and Hurley [3] that the interest of the issues discussed by Hurley and Noë [2] lies in their relevance to the functionalism/physicalism debate. However, I do not think that Hurley and Noë have made it plausible that there are *any* cases in which phenomenology goes with role when role and realizer conflict.

Gray [1] and Hurley and Noë [2,3] suppose that in Braille, visual cortex serves a tactile role and that the phenomenology is tactile too—so phenomenology goes with role rather than realizer. Objections: First, proficient Braille readers have an enlarged sensorimotor representation for the reading finger; and zapping the somatosensory cortex of blind subjects with TMS (transcranial magnetic stimulation) interferes with Braille reading. [4, 5] Hence, whatever tactile phenomenology there is in Braille may be a result of somatosensory activation rather than "visual" activation. Second, the talk of "visual" (or perhaps any modality-specific) cortex that Hurley and Noë depend on is seeming increasingly problematic. Many, perhaps most so-called "visual" areas are better thought of as multi-modal (or multi-sensory) and spatial rather than specifically visual. An fMRI study [6] on sighted subjects found both striate and extra-striate "visual" activation for tactile object recognition. Many different methodologies have located tactile shape recognition in the lateral occipital complex (a "visual" area), including a report of one patient who had both visual and tactile agnosia upon injury in the left occipital cortex. [7]. Tactile motion and visual motion appear to activate the same areas in macaques (viz., MT). [7] There is also evidence that superior occipital activation is necessary for some tactile discriminations from an experimental paradigm [7,8] that contrasted two kinds of tactile judgments of a grating: spacing width and orientation. When occipital sites were zapped with TMS, sighted subjects could still feel the grating and were unimpaired in detecting spacing, but they were impaired in recognition of orientation and also said they were unsure of orientation. However, when TMS was applied to primary somatosensory cortex, both texture and orientation discrimination were reduced to chance, and subjects reported being unable to experience the pattern of the grating. Primary (i.e. striate) "visual" cortex is often not activated in tactile tasks, but Hurley and Noë would be on thin ice if they claimed that primary visual cortex underlies tactile phenomenology in blind subjects, since it is doubtful that primary visual cortex is part of the neural correlate of visual

phenomenology in sighted subjects [9]. Finally, one has to wonder what the basis is for Hurley's and Noë's claim that the phenomenology of Braille is exclusively tactile—might it also be spatial or visual?

Hurley and Noë see TVSS (tactile-visual substitution systems) as involving tactile brain areas playing a visual role—and with visual phenomenology. Again, the brain, role and phenomenology claims are all problematic. First, there is a submitted report (R. Kupers, et.al.) from a PET study of "visual" activation in TVSS. Second, there is doubt as to whether the phenomenology of TVSS is exclusively visual. Reports of TVSS subjects sound as much spatial as visual (though reports of a similar auditory substitution system sound more visual). For example, in the paper by Bach-y-Rita quoted in Noë and Hurley, [10] he says the subjects "reported experiencing the image in space". He describes visual means of analysis (e.g. parallax) but *not* visual phenomenology. Further, whatever visual reports there are from previously sighted subjects might issue from visual imagery using unmodified visual areas. Hurley and Noë [2] appear to presuppose that visual phenomenology is shown by the *spatial function* of TVSS—e.g. that tactile "size" increases as you approach. But non-visual senses might be spatial in the same way, e.g. bat sonar. More significantly, it would be question-begging to appeal to a *functional analysis* of the concept of vision to support functionalism. Third, there are persistent reports in this literature of tactile sensation. For example, the same Bach-y-Rita paper [9] says "Even during task performance with the sensory system, the subject can perceive purely tactile sensations when asked to concentrate on these sensations."

Perhaps TVSS is a case of spatial perception via tactile sensation (maybe Braille is too). One intriguing possibility is that there may be an independent phenomenology both to sensation (grounded in brain state) and to perception (grounded in the function of that brain state). Who knows—maybe *both* traditional functionalism and physicalism will turn out to be partially true!!

I have argued for recasting the debate between functionalism and physicalism in terms of a notion of functional role that should not be modified ad hoc, as is typical with traditional philosophical notions of functional role. [11] I have spelled out the non-ad-hoc role as global access, whereas Hurley and Noë choose sensorimotor contingencies. We agree, I hope, in construing the functionalism/physicalism debate in empirically responsive terms.

References

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